The Evolution of Manufacturing Education

Part 2 in series featuring the Intelligent Manufacturing Systems

by Stefanie Caraviello

Clemson's CU-ICAR Professor Tom Kurfess (right in orange tie) shows an engine dynamometer test cell to guests.

Courtesy of Okuma America Corporation

Imagine: a global university where students can earn an international Master's degree in manufacturing from experts in Japan, Korea, Switzerland, the European Union and the United States.

Imagine: a virtual reality program that allows the manufacturer to become immersed in the design and perfect it even before the product gets to the assembly line.

Both could be a reality in the future of manufacturing.

Both are what the United States delegates of the Intelligent Manufacturing Systems (IMS) program are striving to accomplish.

One of those delegates is Dr. Thomas Kurfess. Kurfess is director of the Carroll A. Campbell Jr. Graduate Engineering Center and the BMW Endowed Chair at Clemson University's International Center for Automotive Research (CU-ICAR). His roles in the Upstate are fueling South Carolina's charge to become the premier automotive research and educational center. His role as the United States Educational delegate for the IMS is allowing him to place South Carolina in the middle of an evolution within manufacturing education.

"On the education side, our job is to get and produce the next generation of plant managers and corporate research engineers...the bottom line with the international partnership is Clemson University can really take the lead in moving some of this forward," said Kurfess.

The IMS is an industry-led, global, collaborative research and development program established to develop the next generation of manufacturing and processing technologies. The Japanese initially proposed the program in 1989 with a vision of global, industrial cooperation and technology sharing.

Nineteen years later, the IMS is composed of five member regions: the United States; Japan; Korea; Switzerland; and the European Union, which includes Norway.

The member regions have the common goal of addressing worldwide issues such as the need to adapt new skills and values in accordance with energy efficiency and sustainability, the need to enable greater standardization and sophistication in manufacturing operations, and the need to advance the manufacturing profession.

To advance the manufacturing profession and workforce, the IMS's ultimate goal is to have an international Master's degree in manufacturing. Dr. Kurfess and other IMS leaders are currently working on designing the curriculum, deciding what it should contain and figuring out how to execute it.

"It is difficult for a single university to supply students with all of their needs in manufacturing. So the idea with the IMS is if all of the manufacturing groups and universities around the world could get together and have some sort of program where we could share our courses, then all of a sudden we can tap in on the expertise around the globe," said Kurfess.

At Clemson University, Dr. Kurfess can use his role as a professor and an IMS delegate to position the university as a global educator and a good resource for state manufacturers.

"We can come up with some great ideas here at CU-ICAR and get them out locally and also get some of these ideas out there on a global scale. It's a great opportunity to get our face out there and build the relationships on a global spectrum," said Kurfess.

Clemson University is also involved in a collaboration with Iowa State University to put together a proposal for the National Science Foundation to use virtual reality technology as a stimulator in the education system.

Jack Harris, the industry delegate for the United States IMS team, says the future of virtual reality technology is going to help stimulate children and get them excited about careers in science, technology, engineering and math.

"You basically put your glasses on like when you go to Disney World and

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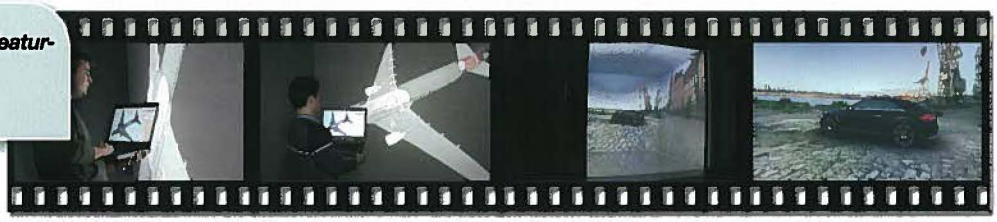
Read it and see it. Watch video featuring virtual reality technology at www.scchamber.net.



Courtesy of Virtual Reality Applications Center, Iowa State University. Kevin Teske

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This user is exploring a virtual environment in Maya and displayed in Iowa State University's 100 million pixel virtual reality environment.

watch those 3D movies. Virtual reality puts you right in your design, and it allows you to walk through it. If you're immersed in your design, it allows you to look at different vantage points and find intuitive changes that can be made to make that design better," said Harris.

Along with serving as the industry delegate for the United States IMS team, Jack Harris is director of advanced manufacturing at Rockwell Collins Inc. Harris also serves as the general manager for the industry consortium PDES Inc., whose host contractor is the South Carolina Research Authority (SCRA) in Charleston.

Harris is helping the IMS develop its key technology platform. Through key technologies, the IMS is working to produce tools and programs, such as the Model Based Enterprise (MBE) project, that will help the next generation of manufacturing.

"The whole notion of MBE is to develop some end product or system in the virtual environment so that you never really build anything before you've answered all the appropriate questions," said Harris.

Harris believes Palmetto State manufacturers need to pay attention to what the IMS is doing through virtual reality for two main reasons. First, Harris says, "at the end of the day, there are going to be more technology educated people in the workforce for South Carolina manufacturers to draw from."

Second, Harris says, "if virtual reality technology plays out like we (the IMS) believes it will, a company's ability to increase productivity will noticeably change, which will allow the company to do more in terms of revenue, and it allows you to solve problems before they are real."

Solving problems, saving money and supplying an educated workforce: these are all ways South Carolina and its Intelligent Manufacturing System connections are helping lead the way to position our state for a strong future in the manufacturing business.

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